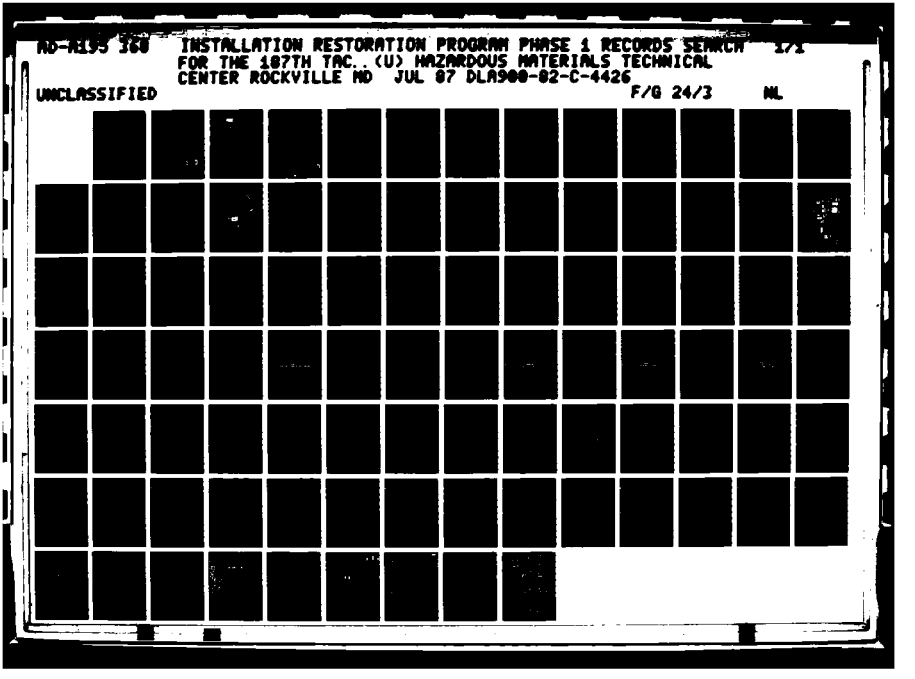
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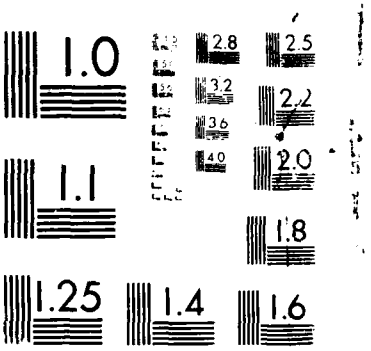


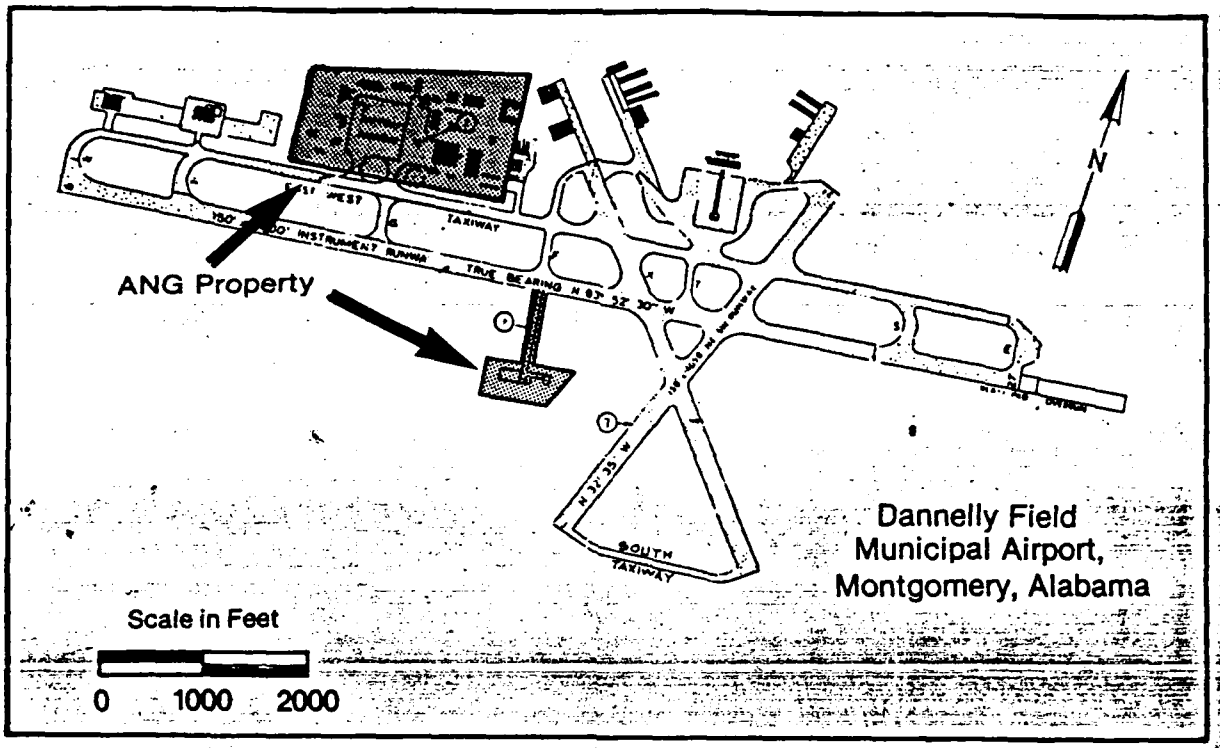
INSTALLATION RESTORATION PROGRAM

Phase I
Records Search

187th Tactical Fighter Group
Alabama Air National Guard
Dannelly Field Municipal Airport
Montgomery, Alabama

Hazardous Materials Technical Center

July 1987



This report has been prepared for the National Guard Bureau, Washington, DC, by the Hazardous Materials Technical Center for the purpose of aiding in the implementation of the Air Force Installation Restoration Program.

INSTALLATION RESTORATION PROGRAM
PHASE I - RECORDS SEARCH FOR

187th TACTICAL FIGHTER GROUP
ALABAMA AIR NATIONAL GUARD
DANNELLY FIELD MUNICIPAL AIRPORT
MONTGOMERY, ALABAMA

July 1987

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Prepared for

National Guard Bureau
Washington, DC 20310

Prepared by

The Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
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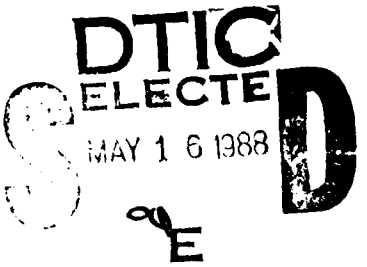
Contract No. DLA 900-82-C-4426



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EXECUTIVE SUMMARY

A. INTRODUCTION

The Hazardous Materials Technical Center (HMTC) was retained in November 1986 to conduct the Installation Restoration Program (IRP) Phase I - Records Search of the 187th Tactical Fighter Group (TFG), Alabama Air National Guard Installation, Dannelly Field Municipal Airport, Montgomery, Alabama (hereinafter referred to as the Base), under Contract No. DLA 900-82-C-4426 (Records Search). The Records Search included:

- an onsite Base visit including interviews with 20 Base employees conducted by HMTC personnel during 19-21 November 1986;
- the acquisition and analysis of pertinent information and records on hazardous materials use, and hazardous waste generation and disposal at the Base;
- the acquisition and analysis of available geologic, hydrologic, meterologic and environmental data from pertinent Federal, State and local agencies; and
- the identification of sites on the Base which may be potentially contaminated with hazardous materials/hazardous waste.

B. MAJOR FINDINGS

The major operations of the 187th TFG that have used and disposed of hazardous materials/hazardous waste include aircraft maintenance; aerospace ground equipment (AGE) maintenance; ground vehicle maintenance; and petroleum, oil, and lubricant (POL) management and distribution. The operations involve such activities as corrosion control, nondestructive inspection (NDI), fuel cell maintenance, engine maintenance, aircraft refueling and pneudraulics. Varying quantities of waste oils, recovered fuels, paints, thinners, strippers, and solvents were generated and disposed of by these activities.

Interviews with 20 Base personnel and a field survey resulted in the identification of five disposal and/or spill sites at the Base which existed at the time of the HMTC site visit.

These sites are potentially contaminated with hazardous materials/hazardous waste:

Site No. 1 - POL Facility
Site No. 2 - Oil/Water Separator and Tank, Building 1304
Site No. 3 - Storm Drainage Discharge Point, East
Site No. 4 - Edge of Aircraft Parking Apron
Site No. 5 - Storm Drainage Discharge Point, West

At Site No. 1, a shallow excavation revealed the presence of what smelled like JP-4 floating on shallow groundwater. Analysis by the Air Force Occupational and Environmental Health Laboratory (AF/OEHL) of groundwater samples taken from an excavation next to Site No. 2, also showed the presence of contamination. Oil or fuel sheens were noted floating on the storm water at Site Nos. 3 and 5, indicating possible offsite contaminant migration. There is evident vegetative discoloration or stress at Site No. 4 where contaminant releases have been reported.

C. *CONCLUSION*

Each of the identified potentially contaminated hazardous materials/hazardous waste sites have been evaluated and given a Hazard Assessment Score (HAS) utilizing the Air Force Hazard Assessment Rating Methodology (HARM):

Site No. 1 - <u>POL Facility</u> (HAS-64)

At the POL facility, there is evidence of past underground storage tank (UST) leakage and reports of minor JP-4 spillage. Groundwater entering a shallow hole that was dug here smelled of JP-4. JP-4 fumes were also evident in storm sewer manholes adjacent to the POL facility.

Site No. 2 - <u>Oil/Water Separator and Tank, Building 1304</u> (HAS-64)

Vegetative stress around this UST and oil/water separator (OWS) indicates that some spillage of oils and waste JP-4 has occurred here. Contaminated groundwater is seeping from beneath a concrete conduit located 3 to 5 feet from the UST/OWS and it is likely that the UST/OWS is the source of contaminants in this leakage. The contents of the OWS includes solvents, paint strippers, and lacquer thinners. The total quantity of waste released at this site is not known.

Site No. 3 - Storm Drainage Discharge Point, East (HAS-63)

This site is the discharge point for storm drainage from a large portion of the Base. Spills from the AGE shop are routed to this point. Also, potentially contaminated groundwater underlying the POL facility discharges at this point. POL sheens have been observed on water at this site since 1982.

Site No. 4 - Edge of Aircraft Parking Apron (HAS-53)

It has been reported that PD-680 and hydraulic fluids have frequently been washed to the edge of the aircraft parking apron. Also, four to five hundred gallons of JP-4 were spilled at this site in 1980.

Site No. 5 - Storm Drainage Discharge Point, West (HAS-56)

A 500-gallon JP-4 spill was routed to this discharge point in 1976. Contaminants leaking from the ground at Site No. 2 are also discharged at this point.

The most likely receptors of potential groundwater contamination resulting from these sites are consumers of drinking water from nearby wells. However, potential threats to local wells are mitigated by the presence of the Mooreville Chalk, which confines the uppermost aquifer. Some sites present potential threats to nearby surface waters either as a result of direct discharge of contaminated storm drainage, or from discharge of potentially contaminated shallow groundwater into nearby surface streams. Likely receptors to any potential surface water contamination are persons using nearby streams for recreational purposes, such as fishing.

D. RECOMMENDATIONS

Because of the potential for contaminant migration to possible receptors, initial investigative stages of the IRP Phase II/IVA are recommended for the five sites potentially contaminated with hazardous materials/hazardous waste. The primary purposes of the subsequent investigations are:

1. To determine whether pollutants at Site Nos. 1 - 5 are present or determine that no pollutants are present, and

2. To determine whether surface or groundwater at each site has been contaminated, and if it has, to give quantification with respect to contaminant concentrations, the boundary of the contaminant plume, and the rate of contaminant migration.

Site No. 1 involves potential JP-4 contamination. It is recommended that soil and water samples be collected at Site No. 1 and analyzed for petroleum hydrocarbons and aromatic volatile organics. It is also recommended that soil gas monitoring be conducted at Site No. 1 to determine the lateral extent of contamination.

Site Nos. 2 through 5 are potentially contaminated with POL products, solvents, paints, strippers or other waste products generated and disposed of by 187 TFG shops. Soil, sediment, and water samples should be collected and analyzed for petroleum hydrocarbons, aromatic volatile organics, halogenated volatile organics and total organic carbon. Soil gas monitoring is also recommended at Site No. 2 to aid in delineation of the lateral extent of contamination.

Due to the Base's hydrogeologic setting, it is recommended that a health risk assessment be considered subsequent to confirmatory IRP Phase II/IVA investigations.

I. INTRODUCTION

A. Background

The 187th Tactical Fighter Group (TFG) is located at the Alabama Air National Guard Installation, Dannelly Field Municipal Airport, Montgomery, Alabama (hereinafter referred to as the Base). The Base has been active since 1953, and over the years the types of military aircraft based and serviced there have varied. Both past and present operations have involved the use of hazardous materials and disposal of hazardous wastes. Because of the use of hazardous materials and disposal of hazardous wastes, the National Guard Bureau (NGB) has implemented its Installation Restoration Program (IRP). The IRP is a four-phase program consisting of the following:

Phase I - Records Search (Installation Assessment) - identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.

Phase II/IVA - Site Characterization/Remedial Action Plan - acquiring data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment; preparing a Remedial Action Plan (RAP); and, if directed by the National Guard Bureau, preparing designs and specifications.

Phase III - Technology Base Development (if needed) - developing new technology for accomplishment of remediation.

Phase IVB - Implementation of Site Remedial Action.

B. Purpose

The purpose of this IRP Phase I - Records Search (hereinafter referred to as Records Search) is to identify and evaluate suspected problems associated

with past hazardous waste handling procedures, disposal sites, and spill sites on Base property. The potential for migration of hazardous contaminants was evaluated by visiting the Base, reviewing existing environmental information, analyzing Base records concerning the use and generation of hazardous materials/hazardous wastes, and conducting interviews with past and present Base personnel who are familiar with past hazardous materials management activities. Relevant information collected and analyzed as a part of the Records Search includes the history of the Base, with special emphasis on the history of the shop operations and their past hazardous materials management procedures; the local geological, hydrological, and meteorological conditions that may influence migration of contaminants; local land use, public utilities, and zoning requirements that affect the potentiality for exposure to contaminants, and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Records Search is limited to spills, leaks, or disposal problems on Base property, and includes:

- o An onsite visit;
- o The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the Base;
- o The acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat and utility data from various Federal and Alabama State agencies;
- o A review and analysis of all information obtained; and
- o The preparation of a report, to include recommendations for further actions.

The onsite visit, interviews with past and present personnel, and meetings with Federal and State agency personnel were conducted during the period 19-21 November 1986. The HMTC Records Search effort was conducted by Mrs. Lata Venkateshwara, Geologist, and Mr. Eric A. Kuhl, Staff Scientist. Resumes of Search Team members are included in Appendix A.

Individuals from the ANG who assisted in the Records Search include Mr. Arthur Lee of Air National Guard Support Center (ANGSC) and selected members of the 187th TFG. The Point of Contact at the Base was 2nd Lt. Michelle S. Fuller, Assistant Base Civil Engineer.

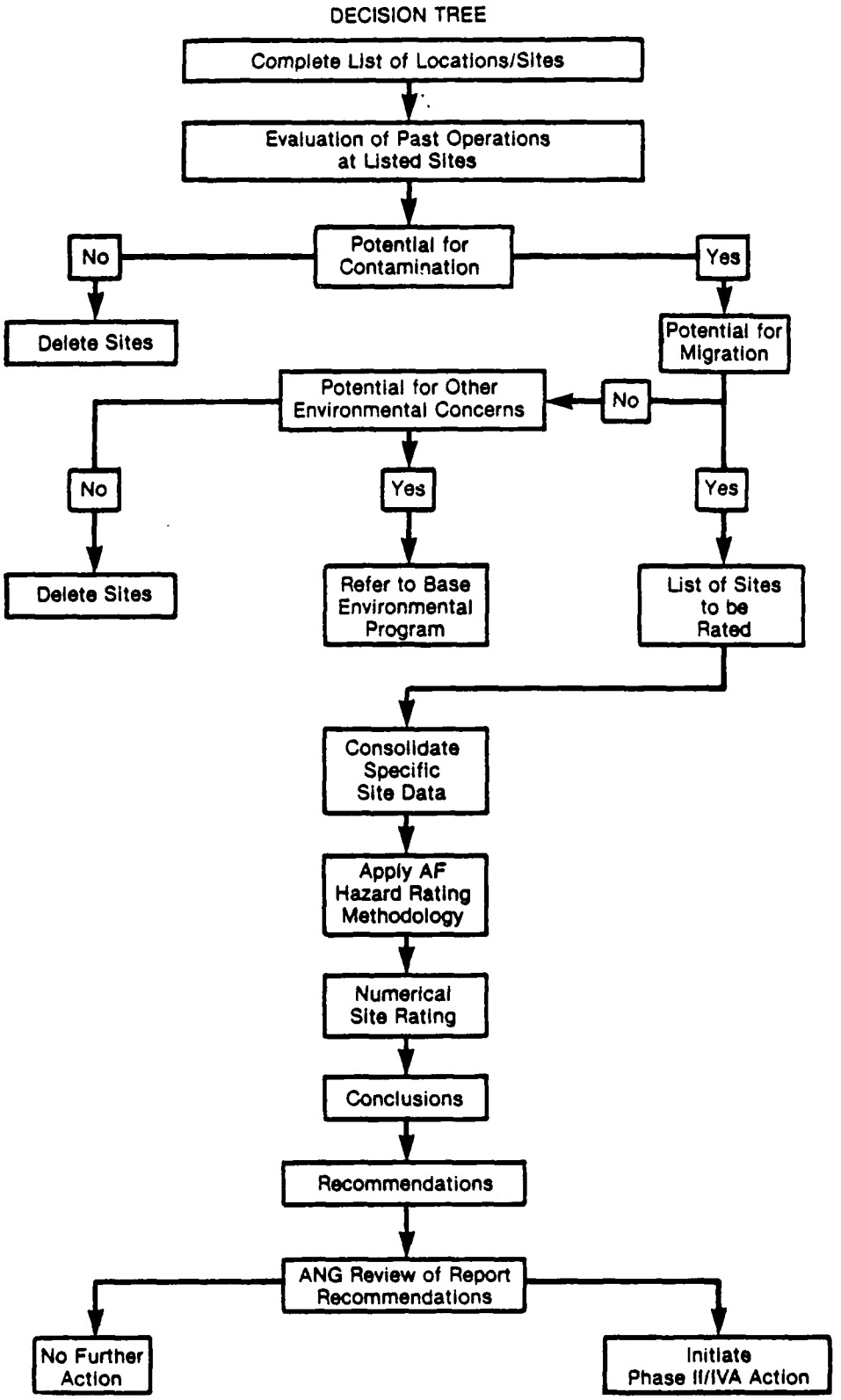
D. Methodology

A flow chart of the Records Search Methodology is presented in Figure 1. This Records Search Methodology ensures a comprehensive collection and review of pertinent site specific information, and is utilized in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Records Search began with a site visit to the Base to identify all shop operations or activities on the installation that may have utilized hazardous materials or generated hazardous waste. Next, an evaluation of past and present hazardous materials/hazardous waste handling procedures at the identified locations was made to determine whether environmental contamination may have occurred. The evaluation of past hazardous materials/hazardous waste handling practices was facilitated by extensive interviews with 20 past and present employees familiar with the various operating procedures at the installation. These interviews were also utilized to define the areas on the Base where any waste materials (hazardous or non-hazardous), either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

Appendix B lists the interviewees principal areas of knowledge and their years of experience with the Base. Historic records contained in the Base's files were collected and reviewed to supplement the information obtained from interviews. Using the information outlined above, a list was compiled of past waste spill/disposal sites identified on the Base that required further evaluation. A general survey tour of the identified spill/disposal sites, the Base, and the surrounding area was conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention was given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Figure 1.
Records Search Methodology Flow Chart.



Detailed geological, hydrological, meteorological, development (land use and zoning), and environmental data for the area of study was also obtained from appropriate Federal and State agencies as identified in Appendix C. Following a detailed analysis of all the information obtained, it was determined that five sites are potentially contaminated with hazardous materials/hazardous waste, and that the potential for contaminant migration exists. Under the IRP program, when sufficient information is available sites are numerically scored utilizing the Air Force Hazardous Assessment Rating Methodology (HARM). A description of HARM is presented in Appendix D. All five of the sites at the Base were scored and each of the sites was recommended for further investigation under the IRP Phase II/IVA process.

II. INSTALLATION DESCRIPTION

A. Location

The 187th TFG is located at Dannelly Field Municipal Airport, Montgomery, Alabama. Dannelly Field is approximately four and one half miles southwest of downtown Montgomery. Entrances to the Municipal Airport and the Base are off of Alabama Rt. 80, which runs north of Dannelly Field.

The 187th TFG occupies an area in the northwestern portion of the air field. Figure 2 shows the location and the boundaries of the Base property covered by this Records Search.

B. Organization and History

The ANG's presence at Dannelly Field dates back to 1953. From 1953 to 1962 the Dannelly ANG unit operated as the 160th Tactical Reconnaissance Squadron (TRS) which flew propeller driven RF-51D "Mustangs," and subsequently, RF-80 "Shooting Stars" and RF-84F "Thunderflash" jets.

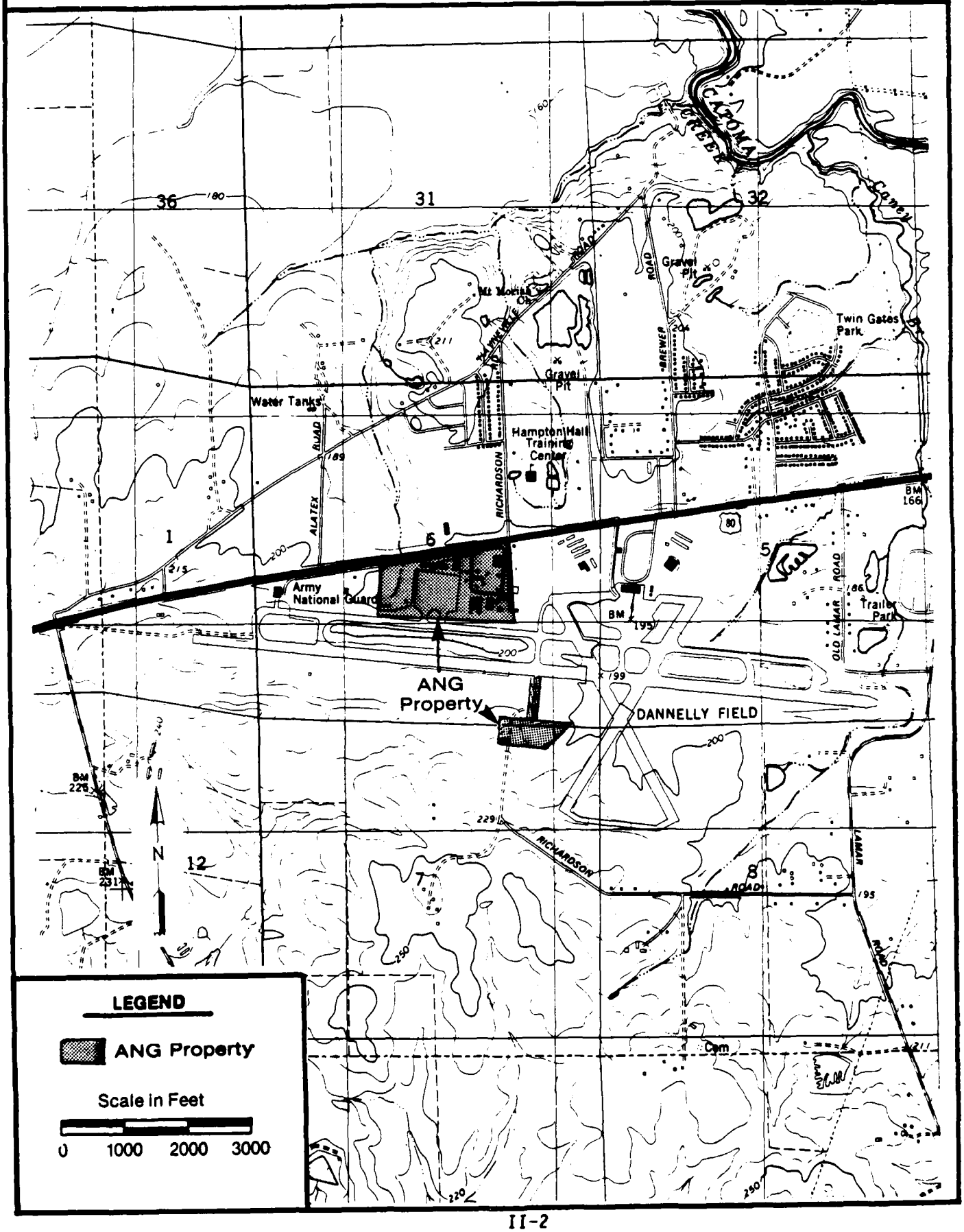
In 1962, the 187th Tactical Reconnaissance Group (TRG) was reorganized to incorporate the 160th TRS. The 187th TRG began flying RF-4C's in 1971. In July 1983, the 187th TRG adopted a fighter group mission and was renamed the 187th Tactical Fighter Group (TFG). The 187th TFG currently flies F-4D fighter planes. The 187th TFG is dedicated to both its Federal mission as a Tactical Fighter Group and to its State role as an arm of the Alabama militia.

HMTC

Adapted From:
USGS Topographic Map,
Cantelous, Alabama,
7.5 Minute Series

Site Map of Alabama ANG,
Dannelly Field Municipal Airport, Montgomery, Alabama.

Figure 2.



III. ENVIRONMENTAL SETTING

A. Meteorology

The following climatological data is largely derived from the Soil Survey of Montgomery County, Alabama (Burgess, 1960). Montgomery County has a humid, mild, almost subtropical climate. The average annual precipitation based on an 83 year record (1873-1958), was 51.12 inches and ranged from 26.82 inches in 1954 to 78.25 inches in 1929. By calculating net precipitation according to the method outlined in the Federal Register (47 FR 31224, July 16, 1982), a net precipitation value of 7.12 inches per year is obtained. Rainfall intensity based on 1 year, 24 hour rainfall is 2.75 inches (calculated according to 47 FR 31235, July 16, 1982, Figure 8.) Most rain that falls from late in April to early June occurs in the form of showers and thundershowers. Droughts occur in spring, late in summer and in early fall. From December until early April, average precipitation is high and rivers overflow frequently. The average annual temperature over an 83-year record (1873-1958) was 68° F. The average monthly temperature ranged from 49.2° F in January to 81.7° F in July. Winds are usually light. Strong winds generally last only a short time and dangerous or catastrophic winds are rare.

B. Geology

Montgomery County is in the northern part of the Coastal Plain physiographic province and encompasses parts of four physiographic divisions of the Coastal Plain: the Terraces, the Black Prairie, the Chunnennuggee Hills, and the Floodplain. The Base is located within the Black Prairie physiographic division (Knowles, 1963).

Geologic formations that crop out in Montgomery County are of sedimentar origin ranging in age from Late Cretaceous rocks overlying the crystalline basement complex, to Pleistocene terrace deposits and Recent alluvium (Knowles, 1963).

The northern part of the Black Prairie physiographic division, where the Base is located, developed on the Mooreville Chalk of Cretaceous age, which was formed in warm shallow seas. Various microfossils, which indicate warm shallow marine origins, comprise a large percent of the chalk (Knowles, 1960).

The Mooreville Chalk is a chiefly gray or yellowish gray to pale-olive silty to finely sandy, argillaceous, fossiliferous chalk. At the Base, the Mooreville Chalk is approximately 137 feet thick (Knowles, 1963). The basal 15 to 20 feet is slightly glauconitic and sandy. The Mooreville Formation dips southward about 40 feet per mile.

The Mooreville Chalk unconformably overlies the Eutaw Formation. The unconformable contact at the Base occurs at a depth of 137 feet from the ground surface. The Eutaw Formation averages between 250 and 300 feet thick at the Base and consists of light gray or greenish-gray cross-laminated fine-to medium-grained well sorted micaceous fossiliferous glauconitic sand that is interbedded with greenish-gray micaceous glauconitic fossiliferous clay. Beds of greenish-gray sandy clay are also common. The Eutaw Formation rests unconformably on the Gordo Formation and dips southward at a rate of about 40 to 65 feet per mile. The Eutaw Formation is extensively developed as a source of water in Montgomery County (Knowles, 1963).

Soils have formed over the Mooreville Chalk, the uppermost bedrock unit underlying the Base. The U.S. Soil Conservation Service (SCS) has not discretely mapped the soil series covering the Dannelly Field Municipal Airport. Often, soils in areas of heavy industrial development such as shopping malls, industrial parks, and airports, are not mapped by the SCS because such soils have been so altered or obscured that identification of specific soils is not feasible. Consequently, precise data describing characteristics of the soils at the Base are unavailable. The SCS has generally classified Base soils within the Sumpter-Oktibbeha-Leeper soil association. Sumpter-Oktibbeha-Leeper soils bordering the base, that have been discretely mapped by the SCS, predomi-

nately consist of clay soils with slow to moderately slow (4.23×10^{-5} cm/sec to 4.23×10^{-4} cm/sec) permeability rates (Burgess, 1960). Borings taken at the Base show a 3 to 5 foot layer of tan and gray plastic clay fill overlying deeper undisturbed clay soils. The character of the soil borings suggest that the source of the fill covering the Base is from cut and fill operations on the airport itself, and therefore, it is assumed that the Base clay fill has characteristics similar to natural clay soils in adjacent areas. Permeability rates for clay soils in general range from very slow to moderately slow ($< 4.23 \times 10^{-5}$ cm/sec to 4.23×10^{-4} cm/sec) (Burgess, 1960).

C. Hydrology

Surface Water

The Base is located within the Alabama River drainage basin (Knowles, 1963). All surface drainage from the Base flows north, through small unnamed streams, towards Catoma Creek. Catoma Creek, located approximately 1.5 miles northeast of the Base, flows northwest towards the Alabama River, which is approximately 5 miles from the Base. Officals of the Alabama Department of Conservation and Natural Resources stated that Catoma Creek is used for fishing and that tributaries to the creek in the area of the airport are probably fished. Manmade drainage ditches and storm drainage culverts channel storm runoff from the Base into tributaries of Catoma Creek. According to sources at the Alabama Highway Department, Urban Planning Division, the Base is not located within a floodplain associated with 100-year occurrence floods.

Groundwater

The Eutaw, Gordo, and Coker Formations are the principal aquifers used for drinking water in Montgomery County. Groundwater in each of these aquifers occurs under confined, or artesian, conditions. The Eutaw Formation, the uppermost of the three aquifers, occurs at a depth of approximately 140 feet from the land surface at the Base, and is approximately 500 to 525 feet thick. The Mooreville Chalk, which is the uppermost geologic unit underlying the Base, serves as an aquiclude overlying the Eutaw aquifer. The Mooreville Chalk is relatively impermeable and does not have sufficient water bearing ca-

pacity to serve as an aquifer (Knowles, 1963).

Underlying the Eutaw aquifer are successively, the Gordo and the Coker aquifers. Each of these three aquifers has been significantly developed by wells installed by the City of Montgomery (Knowles, 1963). The city's "West Well Field," which supplies water to a large portion of Montgomery, is located approximately 1.25 miles northwest of the Base. The city's wells are screened in the basal portion of the Eutaw Formation and throughout the Gordo and Coker Formations. The city has also recently installed two wells two miles northeast of the Base, north of Catoma Creek. These wells are screened in the Gordo and Coker Formations. A well is installed on the municipal airport property but is used only for industrial purposes or for grass watering, and not for drinking water. Until 15 years ago, the Base obtained its water from a well located near the vehicle maintenance shop. The Base now receives its drinking water supplies from the city of Montgomery. An additional well is installed on the Base at the Jet Engine Test Cell, on the south side of the runway. Water from this well is used for jet engine noise suppression and not for drinking. Both the Airport well and the Base wells are screened below the Mooreville Chalk, in the Eutaw, Gordo, or Coker Formations.

Persons living within a mile of the Base on the south side of the Airport are using private wells for drinking water because the city's water lines do not extend to this point. Local U.S. Geological Survey (USGS) authorities have stated that most of these private wells are screened within the Eutaw Formation.

The general direction of groundwater flow in the Eutaw Formation is due west towards the Alabama River. Locally, the flow direction is influenced by pumping of the City's "West Well Field." USGS sources in Montgomery indicate that there is insufficient data to determine the flow direction of aquifers below the Eutaw Formation, but that these two would be locally influenced by pumping of the city's well field.

Some unconfined groundwater occurs at the Base within soils and parent material overlying the Mooreville Chalk. Soil boring records (Christian

Testing Laboratories, 1982) and minor excavations performed by 198th IFG show the top of the water table (24 hours) to be within two feet of the surface at some locations on the Base. Such shallow unconfined groundwater is the most susceptible to contamination from surface pollutants. In general, risks associated with contamination of shallow groundwater arise from direct consumption of unconfined groundwater derived from shallow wells, contaminant percolation into deeper aquifers that are used for drinking water, or lateral flow of contaminated groundwater near the surface and subsequent discharge into local surface streams. The Mooreville Chalk, the uppermost geologic formation underlying the Base, is of insufficient water bearing capacity to serve as an aquifer and there are no wells installed in this formation. The chalk's relative impermeability restricts vertical penetration of shallow groundwater (Knowles, 1963). At the Base, contact with the chalk formation occurs between 11 and 20 feet from the land surface. The chalk extends to a depth of 137 feet. According to local USGS sources, water above the chalk is restricted from downward movement and flows laterally, following the gradient of the Mooreville Chalk and local topographic features. Thus, shallow groundwater at the Base flows northward over the chalk, ultimately discharging into local surface streams which are tributaries of Catoma Creek.

USGS personnel have recently conducted studies regarding the susceptibility of major aquifers in the Montgomery area to surface contamination. The studies indicate that where the Mooreville Chalk occurs, shallow groundwater is generally restricted from entering deeper underlying aquifers. Some interformational transmission of groundwater does occur in the form of upward leakage of groundwater from the Eutaw Formation into the Mooreville Chalk. Thus, although inadequate as an aquifer, the Mooreville Chalk is saturated from its base (137 feet below the land surface) to the level of the potentiometric surface of the underlying Eutaw Formation (approximately 65 feet below the land surface) (Knowles, 1963). Chalk above the potentiometric surface of the Eutaw Formation is much less saturated.

It is possible for contaminant migration to occur through fracture zones which may exist within the Mooreville Chalk. Whether or not such fracturing is present at the Base is undeterminable from available geologic data. Well shafts at the Base penetrating the Mooreville Chalk may also serve as pathways of cross contamination between the shallow and deeper aqufiers. However, given that the hydraulic head of the Eutaw and other aquifers below the Mooreville Chalk is greater than that of shallow groundwater overlying the Chalk, downward vertical movement of shallow groundwater into deeper aquifers is unlikely even through fractures or improperly grouted well shafts. Significant downward vertical movement of shallow groundwater is likely to occur only if the potentiometric surface of the Eutaw aquifer falls below the Mooreville Chalk. The potentiometric surface of the Eutaw aquifer currently lies within the Mooreville Chalk.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with past and present Base employees resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 1 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. If an operation is not listed in Table 1, that operation has been determined on a best-estimate basis to produce negligible (less than 1 gallon per year) quantities of wastes requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with 20 Base personnel (see Appendix B) and subsequent site inspections resulted in the identification of five waste disposal/spill sites. It was determined that all of the five sites are potentially contaminated with hazardous materials/hazardous waste with potential for migration; therefore, these sites should be further evaluated. Each of the five sites were rated using HARM (Appendix D). Figure 3 illustrates the locations of the sites. Copies of completed Hazardous Assessment Rating Forms and a summary and explanation of the factor rating criteria used for site scoring is found in Appendix E. Table 2 summarizes the Hazard Assessment Scores (HAS) of the scored sites.

There is a potential for contaminant migration at the five identified sites. At each of these sites, the contaminant pathways of primary concern are the ground and surface water routes. Site Nos. 3 and 5 are storm water discharge points, which have the potential to directly contribute contaminants to local surface streams. Site Nos. 1 and 2 may present indirect threats to surface water if potentially contaminated groundwater originating at these sites discharges into nearby surface streams. Also at Site No. 2, contaminated

Table 1. Hazardous Waste Disposal Summary: Alabama Air National Guard, Dannelly Field Municipal Airport, Montgomery, Alabama

Shop Name	Building No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantities (Gal./year)	Method of Treatment/Storage/Disposal 1953	1960	1970	1980	1986
Aerospace Ground Equipment	1108	Transmission fluid	100		CONTR		DRMO	
		Used Oil Hydraulic Synthetic	900		CONTR		DRMO	
		Used Batteries	100 units/year				DRMO	
Corrosion Control	1403	Residual Laden Paint and Lacquer Cans (Solidified)	90 cans/year			DPSTR		
		Lacquer Thinner	60		CONTR		DRMO	
		Paint Stripper	150		CONTR		DRMO	
Photo Lab	1316	Acid Developer	3			NEUTR SAN		
Non Destructive Inspection	1305	Emulsifier	55		CONTR		DRMO	
		Penetrant	55		CONTR		DRMO	
		Activator	12			SIL REC		
		Developer (dry)	24 lbs.		CONTR		DRMO	
		Magnaflux Bath	12		CONTR		DRMO	
Engine Shop	1108	JP-4	60		CONTR		DRMO	
		Used Oil	150		CONTR		DRMO	
		PD-680	60		CONTR		DRMO	

Table 1. Hazardous Waste Disposal Summary: Alabama Air National Guard, Dannelly Field Municipal Airport, Montgomery, Alabama (Continued)

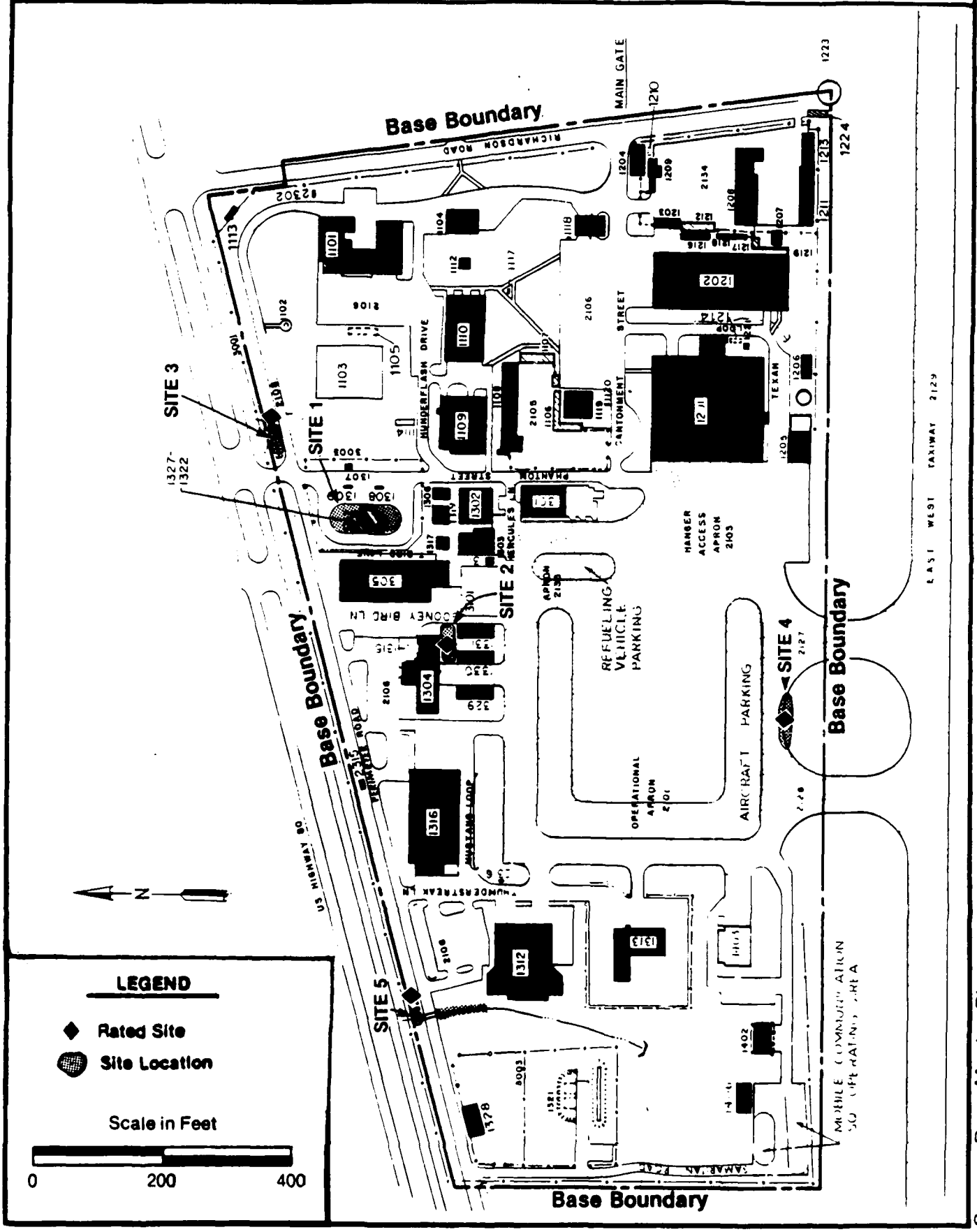
Shop Name	Building No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantities (Gal./year)	Method of Treatment/Storage/Disposal 1953 1960 1970 1980 1986
Weapons Branch	1313	PD-680	120	|-------CONTR------|-----DRMO--------|
		Trichloroethane	4	|-DRMO-|
Vehicle Maintenance	1208	Used Oil	1800	|-------CONTR----|-------DRMO--------|
		PD-680	200	|-------CONTR----|-------DRMO--------|
		Transmission Fluid	20	|-------CONTR------|-----DRMO--------|
		Used Batteries	24 units	|-----DRMO---------|
		Electrolyte	6	|--------NEUTR SAN----------|
		Lacquer Thinner	12	|---------CONTR----|----------DRMO----|
		Enamel	60	|----------DPSTR----------|
Pneudraulics	1201	PD-680	150	|-------CONTR------|-----DRMO--------|
		Hydraulic Fluid	200	|-------CONTR------|-----DRMO--------|
Tire Shop	1109	PD-680	300	|-------CONTR------|-----DRMO--------|
		Paint Stripper	35	|-------CONTR--------|----------DRMO----|
Fuel Systems Shop	1304	JP-4	300	|------CONTR--------|----------DRMO----|
Flightline Maintenance	1201	Hydraulic Fluid	20	|------CONTR--------|----------DRMO----|
		Synthetic Oil	1200	|------CONTR--------|----------DRMO----|

CONTR - Disposed of through contractor
DPSTR - Disposed of in dumpster with general base refuse
DRMO - Disposed of by Defense Reutilization and Marketing Office
SAN SEW - Disposed of in sanitary sewer
NEUTR SAN - Neutralized and disposed of in sanitary sewer
SIL REC - Turned in for silver recovery (offbase)

HMTC

Location of Sites at Alabama ANG , Dannelly Field Municipal Airport, Montgomery, Alabama.

Figure 3.



Source: Base Master Plan
[illegible] AB C 1986

Table 2. Site Hazard Assessment Scores (as derived from HARM): Alabama ANG, Dannelly Field Municipal Airport, Montgomery Alabama

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	1	POL Facility	56	54	82	1.0	64
2	2	Oil/Water Separator and Tank, Building 1304	56	54	82	1.0	64
3	3	Storm Drainage Discharge Point, East	56	54	80	1.0	63
4	5	Storm Drainage Discharge Point, West	56	54	59	1.0	56
5	4	Edge of Aircraft Parking Apron	56	45	59	1.0	53

groundwater is seeping through a crack in a concrete conduit which discharges into a nearby surface stream. Likely receptors of potential surface water contamination from the Base are persons using Catoma Creek, its tributaries, or stream fed ponds for recreational fishing..

Site Nos. 1, 2, and 4 may present a threat to shallow groundwater underlying the Base. Unless breached or fractured, the Mooreville Chalk would tend to restrict the downward migration of potentially contaminated shallow groundwater to deeper aquifers (Eutaw, Gordo, Coker) used for drinking water. Without further investigation, however, it can not be positively determined if contaminants in shallow groundwater can reach these deeper aquifers. If contaminants do penetrate deeper aquifers, likely potential receptors include persons deriving their drinking water from the city of Montgomery's West Well Field, located approximately 1.25 miles from the Base.

Site No. 1 - POL Facility - (HAS-64)

The POL (petroleum, oil, and lubricant) Facility is located at the west corner of Phantom Street and Perimeter Road. The facility consists of an asphalt paved area with a raised, curbed fueling island in the center. Below the fueling island are six 25,000 gallon underground storage tanks (UST) containing JP-4. 187th TFG personnel excavated a 2 to 3 foot deep hole on the fueling island to determine if JP-4 was present in the ground. There was a distinct smell of JP-4 in water enter- ing the hole at the time of excavation and at the time of the HMTC site visit in November, 1986.

The source of the JP-4 is not known. Interviewees familiar with POL facility operations recalled no major spills of JP-4. The POL source could be the occasional tank overfills that spill onto the fueling island. These spills typically result in a loss of anywhere from 1 to 10 gallons of fuel. Also, spills of up to 5 gallons occasionally occur when hoses are unhooked from the tank trucks after filling. Spills at the fueling island either evaporate, seep into the ground, or are cleaned up.

The source of the POL could be leaks from the underground storage tanks. Two of the tanks are 10 years old and the remaining four are 11 years old. There were problems with tank leakage prior to replacement of four of the tanks in 1976, and attempts were made to patch these leaks. Currently, tanks are inventoried for fuel loss and there is no evidence of leakage. Tank interiors are inspected every six years. The tanks are due to be inspected again in 1987. It is also possible that POL leakage may be occurring from the UST piping system. Fuel loss from piping leaks would not be detected during tank gauging.

A strong odor of POL was present in the storm drainage inlets that run along Phantom Street adjacent to the POL facility. Groundwater flows along the path of least resistance. Often, the path of least resistance for shallow groundwater, especially in areas of clayey soils, is the more permeable bedding or less consolidated fill materials underlying manmade structures such as subsurface drainage pipes. Thus, the source of POL fumes in the storm sewer may be from leaks at the POL facility that are flowing along underground sewer piping. If this is the case, contaminants would ultimately discharge at the termination of the sewer line - which is Site No. 3 in this report.

A HAS was applied at this site based on evidence of POL in groundwater, reports of past tank leakage, and reports of occasional JP-4 spillage during tank truck filling. However, precise data regarding the quantity of JP-4 released at this site is not known. No spills exceeding 10 gallons were reported to have occurred at this site, and only a portion of those spills that did occur could potentially impact groundwater; the rest was cleaned up or evaporated. Although the tanks at this site reportedly did leak, there were no reports of large amounts of fuel loss due to leakage. Consequently, in applying a HAS, a value corresponding to a "small quantity" release (1,000 gallons or less) was used. The hazard rating for this site was based on JP-4 since this is the only chemical that has been stored at this site.

Site No. 2 - Oil/Water Separator and Tank, Building 1304 - (HAS-64)

Site No. 2 consists of the area around an oil/water separator (OWS) and a related underground holding tank used to store hazardous waste. The site

is located between Building 1304 (south side, west end) and Buildings 1330 and 1331. The OWS receives contaminated wastewater from the aircraft washrack. Contaminants in washrack wastewater draining to the OWS include Stoddard Solvents, paint strippers and lacquer thinners. An underground overflow tank for the OWS is used to store hydraulic oils and waste POL prior to offsite disposal.

The ground for several feet in any direction of the opening to the OWS holding tank is oil stained, devoid of vegetation, and smells of POL product. Interviewees stated that small amounts (up to 1 gallon) of oil or fuel were frequently spilled on the ground when being poured into the tank opening.

Evidence at this site suggests that the OWS or the holding tank may be leaking. Oily water is seeping up from a small crack in a concrete drainage conduit located 3 to 5 feet from the OWS and holding tank. Contamination in water seeping from the ground at this point indicates that either the tank or the OWS is leaking, or that surface contaminants spilled at this site are infiltrating into shallow groundwater. No other likely sources of contamination exist in this area. As at Site No. 1, more permeable bedding underlying the concrete drainage conduit may represent the path of least resistance for contaminated shallow groundwater around the tank; as a result, groundwater may be flowing towards the conduit. Prior to the HMTC visit, 187th TFG personnel obtained samples of shallow groundwater from a hole dug next to the holding tank. Sample analyses show the presence of aromatic hydrocarbons. Analytical test results for this site are presented in Appendix F.

Application of a HAS was necessary in light of positive sampling results, visible evidence of surface soil contamination, and apparent contaminant migration through shallow groundwater. The only spills that are known to have occurred here are numerous small spills under 1 gallon. Although it is also likely that the UST or OWS is leaking, there are no reports of a major loss of contaminants from either of these sources. Thus, although the precise quantity of waste released at this site is undefined, it is considered for purposes of HAS calculation, to be in the "small quantity" range (1,000 gallons or

less). The hazard rating at this site was based on constituents detected in samples taken here; these include benzene. Benzene has a Sax rating of 3, which corresponds to a HARM hazard rating of 3.

Site 3 - Storm Drainage Discharge Point, East - (HAS-63)

This site is located between Perimeter Road and Route 80, across from the POL facility. Storm drainage from the majority of the northeastern portion of the Base, including the POL area and the AGE shop, is discharged here. Storm drainage routed to this point through underground piping discharges into an earthen stream channel; it then flows off the installation and into a small tributary of Catoma Creek.

187th TFG personnel first noticed contamination problems at this site in 1982, when they saw a POL sheen on the water discharging from the installation here. Installation bioenvironmental personnel sampled the discharge at this site and the sampling test results indicated elevated concentrations of JP-4. Sampling results are presented in Appendix E. The source of the JP-4 could not be determined, however the site is immediately adjacent to the installation POL facility (Site No. 1) where there are indications of POL leakage. The presence of the Mooreville Chalk Formation near the ground surface at the Base restricts the vertical flow of groundwater, and directs groundwater flow laterally towards surface discharge points such as this stream. Contaminated groundwater from the POL facility may be moving in the direction of the surface stream at Site No. 3. A strong odor of POL was detected at the time of the HMTC site visit in several storm drainage inlets along Phantom Road. POL fumes in the drainage inlets suggest that contaminants from some source, possibly the POL facility, are flowing along the storm sewage line which terminates at Site No. 3.

Storm runoff from the Aerospace Ground Equipment (AGE) parking lot flows into the abovementioned storm drainage inlets. Interviewees stated that small spills (up to 0.5 gallon) of hydraulic fuel occur several times a month on the AGE parking lot. Extensive portions of the asphalt lot are stained with absorbed oils. During rains, spilled oils leach from the asphalt and flow into

storm drains leading to the Site No. 3 discharge point. Also, JP-4 spills of up to 50 gallons periodically occur (3-5 times per year) on the AGE lot as a result of overflows from aircraft starting equipment. The portion of these spills which does not evaporate flows into the storm sewer and is discharged at Site No. 3.

An underground holding tank designed to catch overflow from the AGE shop OWS is being used to store used oil and, in past years, spent PD-680. The OWS is malfunctioning and occasionally backs up with water, forcing oils stored in the holding tank out of the tank opening and onto the AGE parking lot. Like other materials spilled on the AGE lot, a portion of these oils reach the Site No. 3 discharge point in runoff. The frequency of OWS back-ups and the amount of oils spilled or leaked onto the AGE parking lot could not be determined.

The 187th TFG personnel place absorbent bags at the discharge point to reduce the flow of contaminated water off the installation. When HMTC visited the site a sheen was visible on the water downstream of the bags. A viscous oily substance was observed in the bottom of the storm drainage inlet along Perimeter Road upstream and approximately 100 feet west of the discharge point. At the discharge point itself, the stream bank was oil stained and exhibited a distinct POL odor.

Visible evidence of offsite contaminant migration from this site requires that a HAS be applied. The total quantity of waste discharged at this site cannot be precisely quantified, although a cumulative total, including spills and leachate from the AGE shop, is estimated to be between two and four thousand gallons. However, the POL products released at this site are lighter than water and float; therefore, all but a small portion of the contaminants would be washed downstream and away from their point of discharge, and are now unrecoverable. Thus, a value corresponding to a "small quantity" spill (1,000 gallons or less), was used in applying a HAS. The intent of further IRP work is to determine if contaminants discharged at this point have, over the years, accumulated and resulted contaminated steam bed sediments which could serve as a potential leachate source. The HARM hazard rating at this site was based upon JP-4, which has a Sax level 3 rating. This results in a HARM "high"

hazard rating.

Site No. 4 - Edge of Aircraft Parking Apron - (HAS 53)

This site consists of the area abutting the southern edge of the aircraft parking apron. In the past, leaks and spills of hydraulic fluid from aircraft and AGE equipment were cleansed from the parking apron with PD-680 solvent. The resulting hydraulic fluid/PD-680 mixture was washed off of the runway and onto the adjacent grass. In 1980, a fuel bladder on a C-130 ruptured, resulting in the release of 400 to 500 gallons of JP-4. Much of this fuel was washed to the edge of the aircraft parking apron. Smaller fuel spills of several gallons which have occasionally occurred on the aircraft parking apron also drained or were washed to this site. Visible vegetative stress is evident along the southern edge of the parking apron.

A HAS was applied at this site because of visible environmental stress and potential threats to underlying groundwater. Beyond the 400 to 500 gallon JP-4 spill, the exact amount of materials released on the parking apron cannot be precisely quantified. However, it is quite likely that the total quantity of spillage reaching the aircraft parking apron since 1953 exceeds 1,000 gallons. This includes the above mentioned 400 to 500 gallon JP-4 spill, frequent JP-4 spills of several gallons, and hydraulic oils and PD-680 solvents released on the parking apron. Thus, for purposes of HARM scoring, a value corresponding to a "medium" quantity release was used. At this site the HARM hazard rating was based on JP-4 toxicity. JP-4 has a Sax toxicity rating of 3. Under HARM, this translates to a "high" hazard rating.

Site No. 5 - Storm Drainage Discharge Point, West (HAS-56)

Site No. 5 is located on the north side of Perimeter Road, approximately 150 feet northwest of Building 1312. Storm discharge from portions of the installation along the runway and most of the western portion of the Base, are channelled to this point. Drainage from this point flows into tributaries

of Catoma Creek. In 1976, a leaking valve on a tank truck resulted in a 500-gallon JP-4 spill, which entered the drainage pipe leading to the Site No. 5 discharge point. More recently, installation personnel have witnessed a POL sheen on water flowing in this drainage channel. The source of the pollution was traced to contaminant leakage from drainage conduit at Site No. 2.

It is likely that the majority of contaminants reaching this site have flowed off the installation and are now unrecoverable. However, it is possible that some contaminants may have accumulated in drainage ditch sediments. A surface water sample taken at the discharge point did not indicate the presence of contamination at the time of the sample; no sediment samples have yet been taken here. However, since chronic contaminant leakage from Site No. 2 drains to this site, it is certain that contaminants are being discharged off the Base at this point; therefore, a HAS was applied. Precise quantification of the total amount of contaminants released at this site is not possible; however, it is estimated to be below 1,000 gallons. Interviewees reported only one 500 gallon spill was discharged off the Base at this site. It is doubtful that the quantity of total leakage from Site No. 2 exceeds 500 gallons. Thus, for purposes of applying a HAS, a value corresponding to a "small" quantity release was employed. Hazard rating at this site was based on JP-4 toxicity, which has a Sax rating of 3. This corresponds to a HARM rating of 3.

C. Critical Habitats/Endangered or Threatened Species

Phone conversations with personnel from the Alabama Department of Conservation and National Resources confirmed that there are no endangered or threatened species of flora or fauna in the vicinity of the Base. There are no wetland areas in the vicinity of the Base or areas designated as wilderness areas.

D. Other Pertinent Facts

- There are no drinking water wells on the Base;
- Sanitary sewage is municipally treated offbase;

- There are no active or inactive landfills on the Base;
- There is no record of using waste oils for road dust control on the installation;
- There are no former or currently operating Fire Training Areas on the installation.

V. CONCLUSIONS

- Information obtained through interviews with 20 Base personnel, review of Base records, and field observations have resulted in the identification of five disposal/spill sites on Base property. Each of the sites are potentially contaminated with hazardous waste/hazardous materials and further IRP analysis should be performed.

- At all of the sites, there are either signs of vegetative stress, a distinct odor of POL products, or visible oil sheens. At Site Nos. 2 and 3, analysis of preliminary samples indicates the presence of contamination. Each of these sites exhibits a potential for contaminant migration and they were all scored using HARM.

- The potential for contamination of shallow groundwater exists at the Base. Base soil boring records show that the depth of the water table at the Base ranges from 2 to 15 feet (Christian Testing Labs, 1982). This relatively shallow water table makes groundwater susceptible to impacts from surface contaminants and from leaking UST or OWS.

- The connection between shallow groundwater encountered within several feet of the surface, and the uppermost aquifer (Eutaw Formation) used as a drinking water source is restricted. The relatively impermeable Mooreville Chalk (137 feet thick at the Base) overlies and confines the Eutaw aquifer. There are no wells in the Montgomery area that use the Mooreville Formation as a water source. The Mooreville Chalk significantly impedes the downward transmission of surface water into lower aquifers. It is possible that contaminants could reach drinking water aquifers underlying the Mooreville Chalk through fractures which may be present in the chalk, or through well shafts penetrating the Mooreville Formation, if they are insufficiently grouted. However, given that the hydraulic head of Eutaw and other aquifers below the Mooreville Chalk is greater than that of shallow groundwater, downward vertical movement of shallow groundwater into deeper aquifers is unlikely.

- Surface channels draining the Base are considered susceptible to contamination from several of the identified sites. Oil sheens have been sighted on water exiting the Base at Site Nos. 3 and 5, and a POL/water mixture is seeping from a crack in a storm drainage conduit at Site No. 2. Contaminants may reach area streams via runoff channelled through storm drains, or through discharge of contaminated groundwater into local streams. The presence of POL odors in storm sewers and seepage of oily water from beneath a surface drainage conduit, suggest that contaminated groundwater at some sites may be flowing along subsurface pathways of manmade structures towards discharge points at local surface streams.

VI. RECOMMENDATIONS

The following general recommendations are intended to determine if groundwater, surface water, sediments, or soils at the five identified sites have been contaminated, or to show that no contamination exists.

Site No. 1 - POL Facility

A shallow excavation (approximately 2 feet deep) installed in the POL facility fueling island by Base personnel revealed the presence of JP-4 in shallow groundwater filling the hole. The contaminant source is assumed to be the POL facility above the POL UST. POL fumes were present in storm drainage inlets adjacent to the POL facility. The source of these fumes may be POL tank or piping leakage that has spread horizontally to the storm sewers through shallow groundwater. The storm sewer pipe and pipe bedding may present a subsurface flow path of least resistance for shallow groundwater in this area.

To determine the extent of contamination at this site, it is recommended that soil borings be installed on the fueling island. Soil samples should be taken at 3 foot intervals down to a depth of 15 feet or to the interface of soil and underlying bedrock. On a one-time only basis, water samples should be taken from any groundwater entering the soil borings. Samples should be analyzed for petroleum hydrocarbons, and aromatic volatile organics.

It is also recommended that soil gas monitoring be performed around the outside of the POL facility in order to delineate the lateral extension of contamination. The presence of POL fumes in storm sewers near the POL facility suggests the possibility that JP-4 may be migrating to storm drainage pipes from the POL area, through shallow groundwater. Soil gas analyses will assist in identification of the source of contamination and aid in determining if vapors in storm sewers are the result of leaks from the POL facility. If the soil gas monitoring indicates the presence of a contaminant plume, installation of groundwater monitoring wells at the site should be considered.

Site No. 2 - Oil/Water Separator and Tank, Building 1304

This site consists of an OWS and associated underground holding tank that were being used, at the time of the HMTC site visit, for hazardous waste and used hazardous material storage. Vegetative stress and oil stained earth are evident around the opening of the holding tank. Water samples taken from a shallow excavation at this site showed the presence of benzene, toluene, and 1,3-dichlorobenzene. Oily groundwater is seeping from a crack in a concrete drainage conduit located several feet from this site, suggesting that either the OWS or holding tank is unsound and leaking contaminants, or that surface contaminants have infiltrated through soils into shallow groundwater.

In order to quantify and delineate the depth of contamination at this site, it is recommended that soil samples be taken at the edges of the tank and OWS. Samples should be taken at 3-foot intervals to a depth of 15 feet, or to the interface between soil and the underlying bedrock. On a one-time only basis, water samples should be taken from any groundwater entering the soil borings. Samples should be analyzed for petroleum hydrocarbons, aromatic volatile organics, and halogenated volatile organics.

Soil gas monitoring should be conducted in areas around the holding tank and OWS and along the concrete drainage conduit to determine the horizontal extent of contamination at this site and to determine if the subsurface conduit is controlling contaminant migration.

Site No. 3 - Storm Drainage Discharge Point, East

Visible signs of contamination were present in water discharging from this site prior to, and at the time of the HMTC site visit. Only liquids were seen flowing through pipes leading to the discharge point. There is a possibility that shallow groundwater, potentially contaminated with JP-4 from the POL facility, is discharging at this site. Storm drainage inlets upgradient of this site receive oil tainted leachate from the AGE parking lot. Inlets leading to the discharge point are emitting a strong odor of POL fumes.

Sediment samples should be obtained at Site No. 3 to determine if contaminants discharging here are bound up in stream bed sediments. Surface water samples should also be taken at Site No. 3. Samples should be analyzed for petroleum hydrocarbons, and aromatic and halogenated volatile organics. Sampling results at this site should be compared with those from Site No. 1 to determine if suspected contaminants from the POL area are discharging at this point.

Site No. 4 - Edge of Aircraft Parking Apron

Hydraulic fluid which has leaked or spilled onto the aircraft parking apron has been cleansed from the apron using PD-680 solvents. The solvent/hydraulic fluid mixture is subsequently washed to the edge of the parking apron. A 500 gallon JP-4 spill also drained to the edge of the apron.

It is recommended that soil samples be taken at the south edge of the aircraft parking apron to verify the presence of contaminants. Samples should be taken at 3 foot intervals to a depth of 15 feet or to the occurrence of bedrock, whichever comes first. On a one-time only basis, water samples should be taken of any water entering the soil borings. Samples should be analyzed for petroleum hydrocarbons, aromatic volatile organics, and halogenated volatile organics.

Site No. 5 - Storm Drainage Discharge Point, West

Storm runoff from along the runway and much of the western portion of the installation discharges off Base property at this site. A fuel spill totalling approximately 500 gallons of JP-4, entered a drainage ditch which discharges at this site. POL tainted drainage emanating from Site No. 2 also discharges off the Base at this point. To determine if contaminants are exiting the Base at this site, it is recommended that surface water and sediment samples be obtained. Samples should be analyzed for petroleum hydrocarbons, volatile aromatic organics, halogenated volatile organics, and total organic carbon.

If contamination of soil, sediments, or shallow groundwater is confirmed at the Base sites, it is suggested that a risk assessment be considered before undertaking remedial action. A risk assessment may be appropriate at the Base due to its hydrogeologic setting, which is not conducive to the transport of surface contaminants into lower drinking water aquifers. Although shallow groundwater at the Base may prove to be contaminated, the threat posed to deeper aquifers that are used for drinking water is largely mitigated by the presence of a thick confining layer (the Mooreville Chalk) near the surface that separates shallow groundwater from underlying aquifers. Given the increased hydraulic head of groundwater below the Mooreville Chalk, downward vertical movement of potentially contaminated shallow groundwater is unlikely.

GLOSSARY OF TERMS

AQUICLUDE - A body of relatively impermeable rock that is capable of absorbing water slowly but does not transmit it rapidly enough to supply a well or spring.

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

CONTAMINANT - As defined by Section 101(f)(33) of SARA shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

DOWNGRADIENT - A direction that is hydraulically downslope, i.e., the direction in which groundwater flows.

ENDANGERED SPECIES - Plant or wildlife species designated as endangered by the U.S. Fish and Wildlife Service.

GROUNDWATER - That part of subsurface water that is in the zone of saturation, including underground streams. Loosely, all subsurface water as distinct from surface water.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981.

HAS - Hazard Assessment Score - The score developed by utilizing the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may

a. cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

UPGRADIENT - A direction that is hydraulically upslope.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

THREATENED SPECIES - Plant or Wildlife species designated as "threatened" by the U.S. Fish and Wildlife Service.

UPGRADIENT - A direction that is hydraulically upslope.

WATER TABLE - The upper limit of the portion of the ground wholly saturated with water.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

WILDERNESS AREA - Areas designated under Federal or State laws as wilderness areas to be managed for their aesthetic or natural value.

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7. Christian Testing Laboratories, Inc., Test Boring Records, SS-171-82 187 TRG (ANG) Military Construction Projects, Dannelly Field, Montgomery, Alabama, 1982.

8. Alabama Air National Guard, Welcome to the 187th Tactical Fighter Group, Alabama Air National Guard, Dannelly Field ANG, Montgomery, Alabama.

9. United States Environmental Protection Agency, Federal Register, Vol. 47, July 18, 1982, Government Printing Office, Washington, D.C.

Appendix A
Resumes of Search Team Members

ERIC A. KUHL

EDUCATION

B.A., political science/environmental policy, St. Mary's College of Maryland, 1982

Right To Know/Hazard Communication Seminar, Executive Enterprises, Inc. April 10-11, 1985

Environmental Laws and Regulations Course, Government Institutes, Inc. May 16-17, 1985

Geographic Aspects of Pollution, University of Maryland, University College, Fall 1984

EXPERIENCE

Three years of experience with on-line information systems, including analysis and summarization of legal/technical documentation pertinent to large-scale computerized litigation support projects. Regulatory experience involving research, tracking and analysis of federal and state transportation/motor carrier safety, environmental and occupational safety regulations, for eventual input into on-line data base systems. Currently conducting site investigations and preliminary assessments for the Air Force's Installation Restoration Program (IRP) and the Federal Bureau of Prisons.

EMPLOYMENT

Dynamac Corporation (1984-present): Staff Scientist

Responsibilities include site investigations, preliminary assessments, and report writing for the Phase I portion of the IRP for the Air National Guard. Also performs similar work for the Department of Justice's Federal Bureau of Prisons. Activities for these tasks entail hazardous waste site identification and assessment, and development of advisory recommendations for further site investigation. Authored the Army Materiel Command's Solvent Recovery Regulatory Impact Report, and performed regulatory analysis for DLA's used drum recycling study.

Previously, participated in the construction of an environmental regulatory information system. This task required detailed familiarization with key environmental regulations including RCRA, CERCLA, and the Hazardous Materials Transportation Act. Was also responsible for tracking relevant legislation and regulations at the federal and state levels.

Automated Sciences Group (1983-1984): Regulatory Analyst

Performed regulatory analysis of the Occupational Safety and Health Administration's regulatory dockets for the OSHA Technical Information System. Also assisted in the compilation of technical guidelines for the OSHA Technical Information System.

Aspen Systems Corporation (1982-1983): Document Analyst

Analyzed and summarized technical documents on the various aspects of nuclear power plant construction for a large-scale litigation project. Was also responsible for screening large numbers of documents to determine their relevance to the case.

PUBLICATIONS

Controversies Emerge on OSHA's Hazard Communication Standard, co-author, HMTC Update 4(4), July 1985.

Used Oil Regulation Proposed, co-author, HMTC Technical Bulletin, HMTC Update 5(4), July 1986.

AMC Solvent Study, Evaluation of Regulatory Impact on Solvent Recovery, July 1986.

LATA R. VENKATESHWARA

EDUCATION

M.S., geology, Ohio State University, 1984
B.A. (cum laude), chemistry, Ohio Wesleyan University, 1982

EXPERIENCE

One year of technical experience in hazardous waste and environmental science fields. Experience includes preparation of statements of work for the Air Force and Air National Guard, groundwater assessment and monitoring, and data base development.

EMPLOYMENT

Dynamac Corporation (1985-present): Junior Staff Scientist

Primarily responsible for preparing statements of work for the Phase IV-A of the Air Force's Installation Restoration Program (IRP). Phase IV-A of the IRP is concerned with determining remedial methods for mitigating site problems. Work involves utilizing technical and field data to determine contaminant plumes at hazardous waste disposal sites on nine Department of Defense installations, visiting sites to assess conditions and developing cost estimates to support feasibility studies of remedial action plans.

Assisted in developing the disposal file for hazardous materials for the Defense Logistics Agency. Researched, through the use of Code of Federal Regulations (CFR) Title 40 and 49, information for solid waste disposal, transportation, storage, and mobile incineration.

University of Michigan (1984): Research Assistant, Geology and Minerology Department

Performed analyses on Great Lake organic sediments. Utilized gas chromatography for carbon, hydrogen, nitrogen, and carbon isotope analyses.

Ohio State University (1982-1984): Instructor, Geology and Mineralogy Department

Taught laboratory courses in junior- and senior-level geology.

Appendix B
Interviewee Information

INTERVIEWEE INFORMATION FOR PERSONNEL OF THE 187 TFG,
ALABAMA ANG, DANNELLY FIELD MUNICIPAL AIRPORT,
MONTGOMERY, ALABAMA

Interviewee No.	Primary Duty Assignment	Years Associated with the 187th TFG, Dannelly Field Municipal Airport Montgomery, Alabama
1	Civil Engineering	8 months
2	AGE	6
3	Tire Shop	6
4	Aircraft Maintenance	2
5	Fuel Maintenance	14
6	Supply	18
7	Civil Engineering	15
8	Photo Lab	22
9	NDI	6
10	Corrosion Control	5
11	Fire Protection	9
12	Grounds Maintenance	20
13	Engine Shop	18
14	Supply	8
15	Weapons Branch	3
16	Field Maintenance	30
17	Flightline Maintenance	34
18	Vehicle Maintenance	31
19	Civil Engineering	11
20	Bioenvironmental	3

Appendix C
Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1. United States Geological Survey
   Montgomery, Alabama
   P.O. Box 210337
   John Scott
   (205) 832-7510

2. Alabama Highway Department
   Urban Planning Division
   1409 Colosseum Blvd.
   Montgomery, Alabama 36130
   (205) 261-6078

3. Alabama Department of Conservation and Natural Resources
   Nongame Wildlife Section
   64 North Union Street
   Montgomery, Alabama 36130
   (205) 261-3486

4. Alabama Department of Conservation and Natural Resources
   Fisheries Section
   64 North Union Street
   Montgomery, Alabama 36130
   Bill Reeves
   (205) 261-3471

5. USDA Soil Conservation Service
   4510 S. Court Street
   Montgomery, Alabama 36105
   (205) 821-8070

6. United States Geological Survey
   Library/Mapping Department
   12201 Reston, Virginia
   (703) 648-4301

Appendix D
USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for

adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/ maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factory to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to installation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C - confirmed, S - suspected) _____
3. Hazard rating (H - high, M - medium, L - low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding

		1		

Subscore (100 X factor score/3) _____

3. Ground water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = [ ]

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

1. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	3
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to + 20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8

B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

CNR122

Appendix E
Site Hazardous Assessment Rating Forms

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 1 - POL Facility

LOCATION Corner of Perimeter Rd. and Pantom St.

DATE OF OPERATION OR OCCURRENCE Since late 1960's

OWNER/OPERATOR 187th TFG, Alabama Air National Guard

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center (HMTC)

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	101	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.9 = 54

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			64	108

Subscore (100 X factor score subtotal/maximum score subtotal) 59

2. Flooding

Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	3	8	24	24
Direct access to ground water	3	8	24	24
Subtotals			94	114

Subscore (100 X factor score subtotal/maximum score subtotal) 82

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 82

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	56
Waste Characteristics	54
Pathways	82
Total 192 divided by 3 =	64
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

64 x 1.0 = 64

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 2-Oil/Water Separator and Tank, Building 1304

LOCATION South Side, West end of Building 1304

DATE OF OPERATION OR OCCURRENCE Chronic release, date of original occurrence unknown

OWNER/OPERATOR 187th TFG, Alabama Air National Guard

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center (HMTC)

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	101	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 X 0.9 = 54

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

54 X 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	80
B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108
Subscore (100 X factor score subtotal/maximum score subtotal)				59
2. Flooding	0	1	0	
Subscore (100 X factor score/3)				0
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	3	8	24	24
Direct access to ground water	3	8	24	24
		Subtotals	94	114
Subscore (100 X factor score subtotal/maximum score subtotal)				82
C. Highest pathway subscore.				
Enter the highest subscore value from A, B-1, B-2 or B-3 above.				
			Pathways Subscore	82

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	56
Waste Characteristics	54
Pathways	82
Total 192 divided by 3 =	64
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

64 x 1.0 = **64**

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 3 - Storm Drainage Discharge Point, East

LOCATION Between Perimeter Rd. and Rt. 80, across from POL facility

DATE OF OPERATION OR OCCURRENCE First detected in 1982

OWNER/OPERATOR 187th TFG, Alabama Air National Guard

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center (HMTC)

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	101	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 X 0.9 = 54

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

54 X 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108

Subscore (100 X factor score subtotal/maximum score subtotal) 59

2. Flooding

Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	46	114

Subscore (100 X factor score subtotal/maximum score subtotal) 40

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	56
Waste Characteristics	54
Pathways	80
Total 190 divided by 3 =	63
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

63 x 1.0 = 63

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 4 - Edge of Aircraft Parking Apron

LOCATION Southern Edge of Aircraft Parking Apron

DATE OF OPERATION OR OCCURRENCE At least since 1980

OWNER/OPERATOR 187th TFG, Alabama Air National Guard

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center (HMTC)

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	101	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C - confirmed, S - suspected) S
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

50 x 0.9 = 45

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

45 x 1.0 = 45

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108

Subscore (100 X factor score subtotal/maximum score subtotal) 59

2. Flooding

Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	54	114

Subscore (100 X factor score subtotal/maximum score subtotal) 47

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 59

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	56
Waste Characteristics	45
Pathways	59
Total 160 divided by 3 =	53
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

53 x 1.0 = 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 5 - Storm Drainage Discharge Point, West

LOCATION North side of Perimeter Rd., 150 feet northwest of Building 1312

DATE OF OPERATION OR OCCURRENCE At least since 1980

OWNER/OPERATOR 187th TFG, Alabama Air National Guard

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center (HMTC)

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	101	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.9 = 54

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108

Subscore (100 X factor score subtotal/maximum score subtotal) 59

2. Flooding

Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	46	114

Subscore (100 X factor score subtotal/maximum score subtotal) 40

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 59

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	56
Waste Characteristics	54
Pathways	59
Total 169 divided by 3 =	56
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

56 x 1.0 = 56

187th TACTICAL FIGHTER GROUP
ALABAMA AIR NATIONAL GUARD
DANNELLY FIELD MUNICIPAL AIRPORT
MONTGOMERY, ALABAMA

USAF Hazard Assessment Rating Methodology
Rating Factor Criteria

The following is a summary and explanation of the rating factor criteria used to score the Base sites under HARM. The majority of the factors in the receptors and pathway categories are the same for each of the rated sites and are therefore stated only once. In those instances where a rating factor varies according to a specific site, the factor is addressed separately for each of the respective sites.

I. RECEPTORS

A. Population within 1,000 feet of site. Factor Rating 3 - Accounting for the population of the Base itself, and the Army National Guard and Airport installations, the total population exceeds 100 people.

B. Distance to nearest well. Factor Rating 2 - Persons living within a mile but farther than 3,000 feet from the airport, use private wells for drinking water. City water lines do not extend to all residences within 1 mile of the Base.

C. Land use/zoning (within one mile radius). Factor Rating 3 - Areas within a one mile radius of the Base are zoned for residential development. Populated neighborhoods exist within 2,000 feet of the Base.

D. Distance to installation boundary. Factor Rating 3 - The base itself at its widest point is only 1,200 to 1,300 feet. Consequently, all sites identified on the Base are within 1,000 feet of the boundary.

E. Critical environments (within 1 mile radius). Factor Rating 0 - There are no areas that are considered critical or fragile environments within 1 mile of the Base.

F. Water quality/use designation of nearest surface water body. Factor Rating 1 - Streams nearest the Base are used for fishing, however they do not serve as drinking water sources.

G. Groundwater use of uppermost aquifer. Factor Rating 3 - The uppermost aquifer at the Base is the Eutaw aquifer, which is a drinking water source and thus warrants a factor rating of 2. However, to avoid confusion, it should be noted that this aquifer is confined by the Mooreville Chalk Formation - a 137 foot thick aquiclude. Groundwater that occurs above and to a small extent with the Mooreville Chalk, is actually the nearest groundwater to the surface and it is this groundwater that is referred to in the "depth to groundwater" factor under the Pathways Category, as being 0-10 feet from the surface. However, this shallow groundwater is not present in sufficient quantity to serve as an aquifer and would not be considered the uppermost aquifer.

H. Population served by surface water supplies within 3 miles downstream of the site. Factor Rating 0 - Surface water is not used as a drinking water source, so no one is served by this source.

I. Population served by aquifer supplies within 3 miles of the site. Factor Rating 3 - The city of Montgomery's "West Well Field", a major municiple water source, is located approximately 1.25 miles from the Base. Some of these wells tap the uppermost Eutaw aquifer.

II. WASTE CHARACTERISTICS

Site No. 1:

- A-1: Waste Quantity - Factor Rating S (small). The precise amount of waste released at this site is undefined, but in the absence of large spill reports or reports of significant leaks from UST, the total amount is assumed to be below 1,000 gallons.
- A-2: Confidence Level - Factor Rating C. Interviewees were able to verify that at least a "small quantity" of waste has been released at this site.
- A-3: Hazard Rating - Factor Rating H (high). The site was rated for JP-4, which has a Sax toxicity rating of 3, and a corresponding HARM hazard rating of 3.

Site No. 2

- A-1: Waste Quantity - Factor Rating S. The precise amount is unknown, but only small spills are known to have occurred and there were no reports of noticeable loss from the tank. Therefore, total loss is assumed to be less than 1,000 gallons.
- A-2: Confidence Level - Factor Rating C. Interviewees were able to verify that at least a "small quantity" of waste was released at this site.

- A-3: Hazard Rating - Factor Rating H. Hazard rating was based upon chemical constituents detected in samples taken at this site which showed the presence of benzene (probably a fraction of a POL compound). Benzene has a Sax rating of 3.

Site No. 3

- A-1: Waste Quantity - Factor Rating S. Although between two and four thousand gallons of contaminants may have been discharged at this point, the majority floated on water and were washed downstream and never actually settled at this site. Therefore, a more accurate amount associated with this site is under 1,000 gallons.

- A-2: Confidence Level - Factor Rating C. Interviewees were able to verify that at least a "small quantity" of hazardous waste has been released at this site.

- A-3: Hazard Rating - Factor Rating H. The hazard rating was based on JP-4 which has a Sax toxicity of 3, which equates to a HARM rating of "high".

Site No. 4

- A-1: Waste Quantity - Factor Rating M. Accounting for one reported 400 to 500 gallon spill, and numerous routine flightline releases of 0.5 to several gallons, the total quantity washed to this site is estimated to exceed 1,000 gallons.

- A-2: Confidence Level - Factor Rating S. It is was confirmed that at least a "small quantity" of waste has been released at this site and interviewee reports suggest that a medium quantity has been released.

- A-3: Hazard Rating - Factor Rating H. Scoring was based on JP-4 toxicity, which has a Sax toxicity of 3. This corresponds to a HARM toxicity of "high".

Site No. 5

- A-1: Waste Quantity - Factor Rating S. The total quantity released at this site, including a 500 gallon JP-4 spill and contaminants from a slow leaking tank or OWS that discharge here, is estimated to be under 1,000 gallons.

- A-2: Confidence Level - Factor Rating C. Interviewees were able to confirm that spills and leaks mentioned above were discharged at this site.

- A-3: Hazard Rating - Factor Rating H. Scoring was based upon JP-4 toxicity, which has a Sax toxicity rating of 3. This corresponds to a HARM toxicity of "high".

B. Persistence Multiplier

Sites Nos. 1 - 5 = 0.9

The Persistence Multiplier for Site Nos. 1, 2, 4 and 5 were based on JP-4 persistence, which falls into the HARM category of "substituted and other ring compounds".

The Persistence Factor at Site No. 3 was based on benzene, which also falls within the HARM category of "substituted and other ring compounds".

C. Physical State Multiplier

Site Nos. 1 - 5 = 1.0

The substances released at Site Nos. 1 - 5 were liquids; therefore these sites were scored using a multiplier of 1.0.

III. PATHWAYS CATEGORY

A. Evidence of Contamination.

Site No. 1: Indirect Evidence - Factor Rating 80. Indirect evidence of contaminant migration at this site consists of a strong POL odor in groundwater, in a shallow hole dug above the JP-4 storage tanks. There is also a strong odor of POL in several manholes next to the POL facility.

Site No. 2: Indirect Evidence - Factor Rating 80. Contaminated groundwater seeping through a crack in a nearby concrete conduit constitutes the indirect evidence of contamination at this site. Besides this site, there are no other likely sources for this contamination.

Site No. 3: Indirect Evidence - Factor Rating 80. Indirect evidence of contaminant migration from this site consists of a visible POL sheen on water discharging at this point and the distinct odor of POL in storm sewer pipes leading to this site.

Site No. 4: No Evidence - Factor Rating 0.

Site No. 5: No Evidence - Factor Rating 0.

B-1: Potential for Surface Water Contamination.

- Distance to nearest surface water: Factor Rating 3. All of the sites on the Base are within 500 feet of surface water. Surface water includes drainage ditches and storm sewers.

- Net precipitation: Factor Rating 2. Net precipitation at the Base is calculated to be 7.12 inches per year.

- Soil erosion: Factor Rating 0. There is no visible evidence of soil erosion at the Base.

- Surface permeability: Factor Rating 2. Permeability rates for soils at the Base is estimated to be between 10^{-4} to 10^{-6}, according to U.S. Soil Conservation Service Reports.

- Rainfall intensity based on 1-year, 24-hour rainfall: Factor Rating 2. The 1-year, 24-hour rainfall is 2.75 inches, according to NOAA storm maps.

B-2: Potential for Flooding - Factor Rating 0. According to officials of the Alabama Department of Highways' Planning Bureau, the Base does not lie within a 100 year floodplain.

B-3: Potential for Groundwater Contamination.

- Depth to groundwater: Factor Rating 3. Base soil boring records show that in some places, the water table lies within 2.5 feet of the surface.

- Net precipitation: Factor Rating 1. See B-1.

- Soil permeability: Factor Rating 2. See B-1.

- Subsurface Flows

  Site No. 1: Factor Rating 3. Leaking UST or tank piping are suspected at this site; both of which exist below the groundwater level and therefore warrant the maximum rating of 3.

  Site No. 2: Factor Rating 3. A leaking OWS or UST is suspected at this site; at least a portion of each of these structures are below the water table level and, therefore, a factor rating of 3 was applied.

  Site No. 3: Factor Rating 0. None of the four rating scale levels for this HARM category adequately fit this site. This site is a surface stream, which cannot accurately be described as being above or below the groundwater table, but is actually a discharge point for shallow groundwater occurring above the Mooreville Chalk Formation. Since this site is, in effect, a point at which groundwater becomes surface water, the lowest subsurface flow factor rating was applied here.

Site No. 4: Factor Rating 1. There is at this time no evidence to suggest that this site is more than occasionally submerged below the groundwater table; therefore, the factor rating of 1 was applied.

Site No. 5: Factor Rating 0. Conditions at this site are equivalent to those at Site No. 3, and therefore, this factor was treated the same.

- Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.

Site No. 1: Factor Rating 3. A leaking UST is suspected at this site; any contaminants leaking from this tank would flow directly into shallow groundwater.

Site No. 2: Factor Rating 3. An OWS or tank may be leaking at Site No. 2. Portions of each of these structures are normally submerged under shallow groundwater. Consequently, any contaminants leaking from the OWS or tank are considered to have direct access to groundwater.

Site No. 3: Factor Rating 0.

Site No. 4: Factor Rating 0

Site No. 5: Factor Rating 0

IV. WASTE MANAGEMENT PRACTICES FACTOR MULTIPLIER

Site Nos. 1-5 = 1.0 None of the sites identified on the Base have any form of contaminant containment.

APPENDIX F

ANALYTICAL RESULTS OF SAMPLING AT THE 187th TACTICAL FIGHTER GROUP, ALABAMA AIR NATIONAL GUARD INSTALLATION (ANGI), DANNELLY FIELD MUNICIPAL AIRPORT, MONTGOMERY, ALABAMA

ANALYTICAL RESULTS OF SAMPLES
TAKEN AT SITE NO. 2

ENVIRONMENTAL SA. LING DATA
(TRACE ORGANICS)

OEHL USE ONL.

(Use this space for mechanical imprint)

(B)

SAMPLING SITE IDENTIFIER (AFR 19-7): 0349 NS 002

BASE WHERE SAMPLE COLLECTED: DANNELLY FIELD (ANG)

SAMPLING SITE DESCRIPTION: UNDERGROUND DUMP TANK OF BLDG 1304

DATE COLLECTION BEGAN (YYMMDD): 850823

TIME COLLECTION BEGAN (24 hour clock): 0945

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE _____ HOURS

MAIL REPORTS TO (circle if changed)

ORIGINAL: 0349 187 INC CLINIC/56PB P O Box 2584 Monty AL 36196-0001

COPY 1:

COPY 2:

SAMPLE COLLECTED BY (Name, Grade, AFSC): MARK S. BARRETT, 156T 90770

SIGNATURE:

AUTOVON:

REASON FOR SUBMISSION: E

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) _____

BASE SAMPLE NUMBER: 64 BS 0063

OEHL PID:

ANALYSES REQUESTED (check appropriate blocks)

VOLATILE HALOCARBONS (VOH)	(10860)	Trichlorofluoromethane	34488	MISCELLANEOUS	
PRES GROUP T1		Vinyl Chloride	39175	VOLATILES	
Volatile Halocarbon Screen	1001460PH			PRES GROUP T1	
Bromodichloromethane	32101			Xylene	81750
Bromoform	32104			Methylethyl ketone	81595
Bromomethane	34413	TRIHALOMETHANES (THM)	(10860)	Methylisobutyl ketone	81596
Carbon Tetrachloride	32102	PRES GROUP T1		Total organic halides	1002106OH
Chlorobenzene	34301	Trihalomethane Potential	1001465MT		
Chloroethane	34311	Total Trihalomethanes	82080		
2-Chloroethylvinyl ether	34576				
Chloroform	32106	VOLATILE AROMATICS (VOA)	(10850)		
Chloromethane	34418	PRES GROUP T1			
Dibromochloromethane	32105	[X] Volatile Aromatic Screen	1001461PA		
1, 2-dichlorobenzene	34536	Benzene	34030	MISCELLANEOUS	
1, 3-dichlorobenzene	34566	Chlorobenzene	34301	EXTRACTABLES	
1, 4-dichlorobenzene	34571	1, 2-dichlorobenzene	34536	PRES GROUP T4	
Dichlorodifluoromethane	34668	1, 3-dichlorobenzene	34566	PCB's	39516
1, 1-dichloroethane	34496	1, 4-dichlorobenzene	34571	Phthalate Esters Screen	1000069PH
1, 2-dichloroethane	34531	Ethylbenzene	34371	bis (2-ethylhexyl) phthalate	39100
1, 1 dichloroethene	34501	Toluene	34010	Butyl Benzyl phthalate	34292
trans-1, 2-dichloroethene	34546			Di-n-butyl phthalate	39110
1, 2-dichloropropane	34541			Diethyl phthalate	34336
cis-1, 3-dichloropropene	34704			Dimethyl phthalate	34341
trans-1, 3-dichloropropene	34699			Di-n-octyl phthalate	34596
Methylene Chloride	34423				
1, 1, 2, 2-tetrachloroethane	34516				
Tetrachloroethylene	34475				
1, 1, 1-trichloroethane	34506				
1, 1, 2-trichloroethane	34511				
Trichloroethylene	39180				

REMARKS

AF FORM 2752B AF FORMS 2752A AND AF 2752B, FEB 85, REPLACE AF FORM 2752, JAN 81 WHICH WILL BE USED

LABORATORY ANAL S REPORT AND RECORD *(General)*

DATE: 7 NOV 1985

TO:

FROM: USAF OEHL/SA
Brooks AFB TX 78235-5501

SAMPLE IDENTITY: Water

DATE RECEIVED: 24 OCT 1985

SAMPLE FROM:

LAB CONTROL NR:

TEST FOR: Volatile Aromatics

Methodology: EPA 602

					Detection Limit	
OEHL NO:	75326					
BASE NO:	GN850003				ND	TR
Benzene	226				1.0	2.0
Chlorobenzene	ND				1.0	2.0
1,2-Dichlorobenzene	ND				2.0	3.0
1,3-Dichlorobenzene	128				2.0	3.0
1,4-Dichlorobenzene	ND				2.0	3.0
Ethylbenzene	63				1.0	2.0
Toluene	216				1.0	2.0

Results in micrograms per liter.

ND-None Detected. Less than the detection limit.
TRACE-Present but less than the quantitative limit.

DATE ANALYZED: 29 OCT 1985

Edward J. Braun
6 NOV 1985

REQUESTING AGENCY (Mailing Address)

187 TAC Clinic/SGPB
P.O. BOX 2584
Montgomery, AL
36196-0001

ANNA WILLIS
Technician

ENVIRONMENTAL S, PLING DATA
(TRACE ORGANICS)

OEHL USE ONLY

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(B)

SAMPLING SITE IDENTIFIER (AFR 19-7): Ø 3 4 9 N S Ø Ø 2

BASE WHERE SAMPLE COLLECTED: DANNELLY FIELD (ANG)

SAMPLING SITE DESCRIPTION: HOLE NEXT TO UNDERGROUND DUMP TANK BLDG 1309

DATE COLLECTION BEGAN (YYMMDD): 8 5 1 0 2 3

TIME COLLECTION BEGAN (24 hour clock): Ø945

COLLECTION METHOD: ☒ GRAB ☐ COMPOSITE _____ HOURS

MAIL REPORTS TO (circle if changed)

ORIGINAL	Ø349	18TTAC CLINIC/SGPB P O Box 2584 Montgomery AL 36196-0004
COPY 1		
COPY 2		

SAMPLE COLLECTED BY (Name, Grade, AFSC) | SIGNATURE | AUTOVON

REASON FOR SUBMISSION: EC

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) _____

BASE SAMPLE NUMBER: GN 85 Ø Ø Ø 2 | OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

VOLATILE HALOCARBONS (VOH) (10860)		Trichlorofluoromethane	34488	MISCELLANEOUS	
PRES GROUP T1		Vinyl Chloride	39175	VOLATILES	
X	Volatile Halocarbon Screen 1001460PH			PRES GROUP T1	
	Bromodichloromethane 32101			Xylene	81551
	Bromoform 32104			Methylethyl ketone	81595
	Bromomethane 34413	TRIHALOMETHANES (THM) (10860)		Methylisobutyl ketone	81596
	Carbon Tetrachloride 32102	PRES GROUP T1		Total organic halides	1002106011
	Chlorobenzene 34301	Trihalomethane Potential 1001465MT			
	Chloroethane 34311	Total Trihalomethanes 82080			
	2-Chloroethylvinyl ether 34576				
	Chloroform 32106	VOLATILE AROMATICS (VOA) (10850)			
	Chloromethane 34418	PRES GROUP T1			
	Dibromochloromethane 32105	Volatile Aromatic Screen 1001461PA			
	1, 2-dichlorobenzene 34536	Benzene 34030		MISCELLANEOUS	
	1, 3-dichlorobenzene 34566	Chlorobenzene 34301		EXTRACTABLES	
	1, 4-dichlorobenzene 34571	1, 2-dichlorobenzene 34536		PRES GROUP T4	
	Dichlorodifluoromethane 34668	1, 3-dichlorobenzene 34566		PCB's	39516
	1, 1-dichloroethane 34496	1, 4-dichlorobenzene 34571		Phthalate Esters Screen	1001069PH
	1, 2-dichloroethane 34531	Ethylbenzene 34371		bis (2-ethylhexyl) phthalate	39100
	1, 1-dichloroethene 34501	Toluene 34010		Butyl Benzyl phthalate	34292
	trans-1, 2-dichloroethene 34546			Di-n-butyl phthalate	39110
	1, 2-dichloropropane 34541			Diethyl phthalate	34336
	cis-1, 3-dichloropropene 34704			Dimethyl phthalate	34341
	trans-1, 3-dichloropropene 34699			Di-n-octyl phthalate	34596
	Methylene Chloride 34423				
	1, 1, 2, 2-tetrachloroethane 34516				
	Tetrachloroethylene 34475				
	1, 1, 1-trichloroethane 34506				
	1, 1, 2-trichloroethane 34511				
	Trichloroethylene 39180				

REMARKS

AF FORM 2752B FEB 85 AF FORMS 2752A AND AF 2752B, FEB 85 REPLACE AF FORM 2752, JAN 81, WHICH WILL BE USED

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: 19 NOV 1985

TO:

FROM: USAF OEHL, SA
BROOKS AFB TX 78235 - 5501

SAMPLE IDENTITY: WATER

DATE RECEIVED: 24 OCT 1985

SAMPLE FROM:

LAB CONTROL NO:

TEST FOR: Volatile Halocarbons

Methodology: EPA Method 601

OEHL NO:	75325	75327	75328			DET.
BASE NO:	GNES0002	GNES0004	GNES0005			LIMIT
Bromodichloromethane	ND	ND	ND			0.1
Bromoform						0.2
Bromomethane						1.0
Carbon Tetrachloride						0.1
Chlorobenzene						0.2
Chloroethane						0.5
2-Chloroethylvinyl ether						0.1
Chloroform						0.1
Chloromethane						0.1
Dibromochloromethane						0.1
1,2-Dichlorobenzene						0.2
1,3-Dichlorobenzene						0.2
1,4-Dichlorobenzene						0.2
Dichlorodifluoromethane						0.1
1,1-Dichloroethane						0.2
1,2-Dichloroethane						0.2
1,1-Dichloroethene						0.1
trans-1,2-Dichloroethene						0.1
1,2-Dichloropropane						0.1
cis-1,3-Dichloropropene						0.2
trans-1,3-Dichloropropene						0.2
Methylene Chloride	1.6					0.2
1,1,2,2-Tetrachloroethane	ND					0.1
Tetrachloroethylene						0.1
1,1,1-Trichloroethane						0.1
1,1,2-Trichloroethane						0.1
Trichloroethylene						0.1
Trichlorofluoromethane						0.1
Vinyl Chloride						0.2

Results in Micrograms per Liter

DATE ANALYZED: 05 NOV 1985

Edward J. Brown

19 NOV 1985

REQUESTING AGENCY (Mailing Address)
197 TAC CLINIC/SGPB
P.O. Box 2584
Montgomery AL 36196
-0001

ND-NONE DETECTED, LESS THAN THE DETECTION LIMIT.

TRACE-PRESENT BUT LESS THAN THE QUANTITATIVE LIMIT
TRACE = 2 times Detection Limit.

ERIC A. BANKS, Capt, USAF
Chemist

ANALYTICAL RESULTS OF SAMPLES
TAKEN AT SITE NO. 3

ENVIRONMENTAL SAMPLING DATA

OEHL USE ONLY

(Use this space for mechanical imprint)

(A-)

SAMPLING SITE IDENTIFIER (AFR 19-7): Ø349 NS ØØ1

BASE WHERE SAMPLE COLLECTED: DANNELLY FIELD (ANG)

SAMPLING SITE DESCRIPTION: STORM DRAIN RUN OFF

DATE COLLECTION BEGAN (YYMMDD): 81511Ø1213

TIME COLLECTION BEGAN (24 hour clock): Ø93Ø

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE _____ HOURS

MAIL REPORTS TO (circle if changed)

ORIGINAL	Ø349	187 TAC CLINIC/SGPB PO Box 2584 MONTGOMERY, AL 36196-0001
COPY 1		
COPY 2		

SAMPLE COLLECTED BY (Name, Grade, AFSC): BARRETT MARK S 90770 TSGT

SIGNATURE: Mark S Barrett

AUTOVON: 742-9402

REASON FOR SUBMISSION: [E] A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) _____

BASE SAMPLE NUMBER: GFN85ØØØ1

OEHL PID:

ANALYSES REQUESTED (Check appropriate blocks)

	GROUP A			Hardness	00900		Silica	00955		2, 4, 5-T	39740
	Ammonia	00610		Iron	01045		Specific Conductance	00095		2, 4, 5-TP-Silvex	39760
	Chemical Oxygen Demand	00340		Lead	01051		Sulfate	00945			
	Kjeldahl Nitrogen	00625		Magnesium	00927		Surfactants-MBAS	38260			
	Nitrate	00620		Manganese	01055		Turbidity	00076			
	Nitrite	00615		Mercury	71900						
	Oil & Grease	00560		Nickel	01067						
	Organic Carbon	00680		Potassium	00937						
	Orthophosphate	00671		Selenium	01147		GROUP H				
	Phosphorus, Total	00665		Silver	01077		Aldrin	39330			
X	JP4			Sodium	00929		BHC Isomers	39340			
	GROUP D			Thallium	01059		a-BHC	39337			
	Cyanide, Total	00720		Zinc	01092		b-BHC	39338			
	Cyanide, Free	00722					d-BHC	34259			
							Chlordane	39350		GROUP J	
	GROUP E			GROUP G			DDT Isomers	39370		Sulfides	00745
	Phenols	32730		Acidity, Total	70508		p, p-DDD	39310			
				Alkalinity, Total	00410		p, p-DDE	39320			
	GROUP F			Alkalinity, Bicarbonate	00425		p, p-DDT	39300			
	Antimony	01097		Bromide	71870		Dieldrin	39380		ON SITE ANALYSES	
	Arsenic	01002		Carbon Dioxide	00405		Dursban	77969		PARAMETER	VALUE
	Barium	01007		Chloride	00940		Endrin	39390		Flow 50050	mgd
	Beryllium	01012		Color	00080		Heptachlor	39410		Chlorine, Total 50060	mg/l
	Boron	01022		Fluoride	00951		Heptachlor Epoxide	39420		Dissolved Oxygen 00300	mg/l
	Cadmium	01027		Residue, Total	00500		Lindane	39782		pH 00400	units
	Calcium	00916		Residue, Filterable (TDS)	70300		Methoxychlor	39480		Temperature 00010	°C
	Chromium, Total	01034		Residue, Nonfilterable	00530		Pramitol (Prometon)	XY4200000		Odor 00086	
	Chromium VI	01032		Residue, Settleable	50085		Toxaphene	39400		Iodide 71865	
	Copper	01042		Residue, Volatile	00505		2, 4-D	39730		Sulfite 00740	

REMARKS

AF FORM 2752A FEB 88 AF FORMS 2752A AND 2752B, FEB 88, REPLACE AF FORM 2752, JAN 81, WHICH WILL BE USED.

15.24

3. LABORATORY PERFORMING ANALYSIS	5. LAB SAMPLE NUMBER	6. REQUESTOR SAMPLE NO
OEHL	75324 00001	GN850001 00002

SAMPLE COLLECTION INFORMATION

7. EVE DESCRIPTION	8. EVE LOCATION NO	9. FLOWRATE AT EVE 00058 GAL/MIN	10. WEATHER 00047	4. DATE RECEIVED BY LAB	5. DATE ANALYSIS COMPLETED
24 OCT 85 2 28 PM CJ				24 OCT. 85	14 NOV. 85

ON-SITE ANALYTICAL RESULTS

12. WATER TEMP 00010 °C	11. PH 00400 UNITS	13. DISS O2 00300 MG/L

14. COLLECTION DATE/PERIOD	15. COLLECTORS NAME	18. RESULTS OF OTHER ON-SITE ANALYSES

16. SAMPLING TECHNIQUE	16. PHONE NUMBER

17. REASON FOR SAMPLE SUBMISSION
NPDES

ANALYSES REQUESTED AND RESULTS

PRESERVATION GROUP A

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	
Total Organic CARBON as C	00680	

PRESERVATION GROUP B (3)

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-TR Method	00560	136.0
JP-4		

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	
NITRATE as N Cd Reduct Method	00630	
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F

PARAMETER	DISS	TOTAL	MG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01045	01045	
LEAD	01049	01051	
MANGANESE	01055	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	
CALCIUM as Ca	00915	00916	
MAGNESIUM as Mg	00925	00927	
POTASSIUM	00935	00937	
SODIUM	00930	00929	

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L
BORON	01022	
BORON, Dissolved	01020	
CHLORIDE	00940	
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

21. ORGANIZATION REQUESTING ANALYSIS
Dannelly Field

SITE C

CONSIST 1

REVIEWED BY

APPROVED BY

AMD FORM 201 NON-POTABLE WATER ANALYSIS

LABORATORY ANALYSIS REPORT AND RECORD (General)	DATE 19 NOV 1985
TO: 187 TAC clinic	FROM:
SAMPLE IDENTITY GN850001	DATE RECEIVED 24 Oct. 85
SAMPLE FROM	LAB CONTROL NR 75324
TEST FOR Fuel Characterization	

O+G = 136 mg/l

Capillary gas chromatography shows sample GN850001 contains the n-alkane components C-9 - C-15 in the same relative concentration as some types of JP-4 analyzed in this lab.

John C. Bonnin 2Lt. USAF
Chemist, Special Projects Function

REQUESTING AGENCY (Mailing Address)
187 TAC clinic/SGPB
PO Box 2584
Montgomery, AL 36196-0001

END

DATE

FILMED

8-88

DTIC